

## CLAIMS

1. A propylene-based polymer having a propylene represented by the following characteristics (1) to (3):

(1) The weight-average molecular weight Mw is from not smaller than 5,000 to less than 1,000,000 as measured by GPC;

(2) In  $^{13}\text{C}$ -NMR, peaks derived from the carbon atom in a methyl group in a propylene unit chain formed by head-to-tail bond are observed and, supposing that the chemical shift of the top of a peak assigned to a pentad represented by mmmmm is 21.8 ppm, the ratio of the area  $S_5$  of the peak having its top at 21.8 ppm to the total area  $S$  of peaks appearing within a range of from 19.8 ppm to 22.2 ppm is from not smaller than 10% to not greater than 60%, and, supposing that the area of a peak having its top at 21.5 to 21.6 ppm is  $S_6$ , the relationship  $4 + 2S_5/S_6 > 5$  can be established; and

(3) Regio irregular units based on 2,1-inserted propylene monomer and/or 1,3-inserted propylene monomer are present in its main chain and the sum of the ratio of regio irregular units based on 2,1-insertion and 1,3-insertion to all propylene insertions is not smaller than 0.05%.

2. The propylene-based polymer as claimed in

Claim 1, which is a propylene polymer or propylene-olefin copolymer.

3. The propylene-based polymer as claimed in Claim 2, wherein the propylene-olefin copolymer is a copolymer of propylene and ethylene.

4. The propylene-based polymer as claimed in any one of Claims 1 to 3, having the following characteristic (4):

(4) In  $^{13}\text{C}$ -NMR, peaks derived from the carbon atom in a methyl group in a propylene unit chain formed by head-to-tail bond are observed and, supposing that the chemical shift of the top of a peak assigned to a pentad represented by mmmm is 21.8 ppm and the integrated intensity of peaks appearing at from 24.5 ppm to 25.0 ppm, from 33.5 ppm to 34.2 ppm, from 14.2 ppm to 23.5 ppm and from 27.5 ppm to 28.0 ppm are  $S_1$ ,  $S_2$ ,  $S_3$  and  $S_4$ , respectively, the following relationship can be established:

$$0 < (S_1 + S_2) / (S_1 + S_2 + S_3 + 0.5S_4) < 0.05.$$

5. The propylene-based polymer as claimed in Claim 3 or 4, wherein supposing that the propylene unit is represented by P, the 2,1-inserted propylene unit is represented by  $^t\text{P}$  and the ethylene unit is represented by

E, no partial structures represented by PEE, <sup>t</sup>PEE, EEE, EPE and E<sup>t</sup>PE are present or the total ratio of the partial structures is not greater than 3% of that of all triads formed by P, <sup>t</sup>P and E.

6. The propylene-based polymer as claimed in Claim 1, wherein the weight-average molecular weight Mw is from not smaller than 5,000 to less than 200,000 as measured by GPC and the polymer is a propylene monomer.

7. The propylene-based polymer as claimed in any one of Claims 1 to 6, wherein both the regio irregular units based 2,1-inserted propylene monomer and 1,3-inserted propylene monomer are present in the main chain.

8. The propylene-based polymer as claimed in any one of Claims 1 to 7, wherein both the regio irregular units based 2,1-inserted propylene monomer and 1,3-inserted propylene monomer are present in the main chain and the ratio of said regio irregular units based on 1,3-insertion to all propylene insertions is greater than the ratio of said regio irregular units based on 2,1-insertion to all propylene insertions.

9. The propylene-based polymer as claimed in any one of Claims 1 to 8, which is produced in the presence

of a single site catalyst.

10. The propylene-based polymer as claimed in Claim 9, wherein the single site catalyst is a  $C_1$ -symmetrical ansa-metallocene compound containing a transition metal and having a bridging group.

11. The propylene-based polymer as claimed in Claim 10, wherein the transition metal is titanium, zirconium or hafnium.

12. The propylene-based polymer as claimed in any one of Claims 1 to 11, having an insoluble content of not greater than 1% by weight as dissolved in heptane at 98°C in a concentration of 10% by weight.

13. The propylene-based polymer as claimed in any one of Claims 1 to 12, having an insoluble content of not greater than 1% by weight as dissolved in toluene at 25°C in a concentration of 10% by weight.